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| SCOTT C. HARRIS Fish & Richardson P.C. Suite 500 4350 La Jolla Village Drive San Diego, CA 92122 | | EXAMINER ROY, SIKHA | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/043,786

Applicant(s)

SEO ET AL.

Examiner

Sikha Roy

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) 48-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-47 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,4,5,6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-47, drawn to luminescent device, classified in class 313, subclass 504.
- II. Claims 48-53, drawn to method of manufacturing a luminescent device, classified in class 445, subclass 24.

Inventions Group II and Group I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product of the luminescent device as claimed can be made by another and materially different process such as vacuum vapor deposition of organic compounds.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and because of their divergent subject matter, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Scott Harris on 8/29/03 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-47. Affirmation of this election must be made by applicant in replying to this Office action.

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Claims 48-53 are withdrawn from further consideration by the examiner

37CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

Claims 1,4 are objected to because of the following informalities:

In claims 1 and 4 organic compound is cited as 'high molecular compound'. It is not clear whether it is referring to 'high molecular weight or high molecular density'.

In claims 8 and 29, 'group 17' should be replaced with --group 15 to group 17--.

In claim 4 page 33 line 29 'organic ompound' must be replaced by --organic compound--.

Appropriate corrections are required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4,9-11,25 and 30-32 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,392,339 to Aziz et al.

Regarding claim 1 Aziz discloses (Fig. 2 column 4 lines 35-56) an organic light emitting device comprising an anode 34, a cathode 42, an organic compound layer interposed between the anode and cathode comprising a hole transport compound (HTM) 36 and an electron transport compound (ETM) 40 and a mixed region 38 comprising a mixture of hole transport compound and electron transport compound located apart from the anode and cathode. Aziz further discloses (column 6 lines 60-65) the hole transport compound includes polyamine, a high molecular weight compound.

Referring to claim 4 Aziz discloses all the limitations which are same as claim 1 and also second organic compound a stilbene derivative, a high molecular weight compound.

Regarding claim 25 Aziz discloses all the limitations same as claim 1 and the second organic compound containing metal chelates tris(-8 hydroxyquinolate) aluminum (Alq_3) a low molecular compound.

Regarding claims 9 and 30 Aziz discloses the first organic compound a hole transport compound and second compound as light emitting compound.

Regarding claims 10, 11 and 31, 32 Aziz discloses (column 6 lines 60-66) the first organic compound is selected from polyaniline and its acid-doped forms, poly(phenylene vinylene), porphyrin derivatives which are high-molecular compound inherently including pi electrons.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 – 8, 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,392,339 to Aziz et al. and further in view of U.S. Patent 5,925,980 to So et al.

Claim 5 differs from Aziz in that Aziz does not exemplify the concentration of the first and second organic compounds changing continuously in the mixed region.

So in analogous art of organic electroluminescent device with graded region discloses (abstract) the graduated region between the hole transporting region and

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electron transporting region changes continuously in the mixed region. So further discloses (column 4 lines 13-25) because of continuous change from hole transporting to electron transporting organic material the two materials are intermixed and disseminated so that no fixed interface is formed and adhesion problem of the two layers is resolved. The mixed region appears as a single layer of material which cannot separate and generally allows a smooth movement of carriers there across. This results in an improved organic electroluminescent device with improved reliability and operation (column 1 lines 60-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the mixed region of Aziz as continuous region as taught by So for resolving the problem of adhesion of two organic layers, smooth movement of carriers across the mixed region and resulting in an improved organic electroluminescent device with improved reliability and operation.

Claim 26 recites the same limitations as of claim 5 and hence is rejected for the same reason.

Claims 6 and 27 essentially recite the same limitation as of claim 5 and hence are rejected for the same reason. The recitation of continuous change in first and second organic compounds in the mixed region is detected by SIMS has not been given patentable weight because it is considered an intended use recitation. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

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Regarding claims 7, 8 and 28, 29 Aziz discloses (column 7 lines 21-65) first and second organic compounds comprise elements of Group 15 to Group 17 consisting of nitrogen, oxygen, chlorine fluorine.

Claims 2,3,12 - 17,20-23 and 33,34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,392,339 to Aziz et al. and further in view of U.S. Patent 6,566,807 to Fujita et al.

Regarding claims 2 and 3 Aziz does not disclose a guest added to the mixed region in the host of the two organic compounds.

Fujita in analogous art of organic electroluminescent elements discloses (Fig. 3 column 9 lines 12-23) organic electroluminescent element comprising a third organic compound for light emission between the first organic (hole transporting) compound and the second organic (electronic transporting) compound. It is to be noted this separate emitter layer makes it possible selection of emitter materials free from intractable problem of fabrication and stability of the device and hence allows easy fabrication of the device with a good performance (as evidenced by 'Electroluminescence in Organic Films with Three-Layer Structure' by Adachi, Tokito Tsutsui and Saito).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include the third light emitting organic compound as taught by Fujita as guest in a region comprising the hosts of first and second organic compounds. This provides the benefit of possible selection of emitter materials free from intractable problem of fabrication and stability of the device and hence allows easy fabrication of the device with a good performance.

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Referring to claim 3 Fujita discloses the guest comprising fluorescent organic material which demonstrates light emission.

Regarding claims 12 Aziz does not disclose the second organic compound selected from the group consisting of polyparaphenylenevinylene derivative, polydialkylfluorene derivative, polyvinylcarbazole derivative and polyphenylene derivative.

Fujita discloses (column 8 lines 21-27) that the organic compound (light emitting material) can be selected from polyparaphenylenevinylene.

It would have been obvious to use polyparaphenylenevinylene as the second organic compound of Aziz as disclosed by Fujita instead of stilbene derivatives for light emitting material because selection of known material for a known purpose is within the skill of the art.

Regarding claims 13 and 33 Fujita discloses (column 10 lines 5-61, Fig. 5) the two compounds can be electron transport compound and light emitting compound.

Regarding claims 14 and 34 the first organic compound for electron transporting being a high molecular compound inherently includes pi electrons.

Claim 15 essentially recites the same limitation as of claim 12 and hence is rejected for the same reason.

Regarding claim 16 Aziz discloses (column 9 lines 60-65) the mixed region can be formed to include three separate layers.

Aziz does not exemplify the separate third organic compound added as a guest in the region comprising both first and second organic compounds.

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Fujita discloses (Fig. 3 column 9 lines 12-23) organic electroluminescent element comprising a third organic compound for light emission between the first organic (hole transporting) compound and the second organic (electronic transporting) compound. It is to be noted this separate emitter layer makes it possible selection of emitter materials free from intractable problem of fabrication and stability of the device and hence allows easy fabrication of the device with a good performance (as evidenced by 'Electroluminescence in Organic Films with Three-Layer Structure' by Adachi, Tokito Tsutsui and Saito).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include the third light emitting organic compound as taught by Fujita in a region comprising the first and second organic compounds. This provides the benefit of possible selection of emitter materials free from intractable problem of fabrication and stability of the device and hence allows easy fabrication of the device with a good performance.

Regarding claim 17 Aziz in view of Fujita disclose the organic electroluminescent device wherein first and second organic compound are selected from group consisting of hole transport compound, electron transport compound and the third organic compound demonstrating light emission.

Referring to claims 20 and 21 Fujita discloses (column 8 lines 21-24) the third organic compound as oxadiazole compounds and hence inherently possesses larger energy difference between a highest occupied molecular orbital and a lowest unoccupied molecular orbital than first and second organic compounds.

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Regarding claims 22 and 23 Fujita discloses third organic compound as fluorescent organometallic compound such as azomethine zinc complex.

Regarding claims 35 and 36 Fujita discloses (column 8 lines 21-30, column 7 lines 42,43) the first organic compound as light emitting material (aromatic dimethylidene compounds) and the second compound is a hole transport compound such as polyvinyl carbazole.

Referring to claims 37 and 38 Fujita discloses the first organic compound as light emitting material (aromatic dimethylidene compounds) and the second compound can be electron transport compound containing polyvinyl carbazole, poly-p-phenylenevinylene (column 35 claim 11).

Claims 18,19,22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,392,339 to Aziz et al. and U.S. Patent 6,566,807 to Fujita et al. and further in view of "High Quantum Efficiency in Organic Light-Emitting Devices with Iridium-Complex as a Triplet Emissive Center" by Tsutsui et al. (Literature 8).

Regarding claim 18 Aziz and Fujita do not disclose the third organic compound demonstrating light emission from a triplet excited state.

Tsutsui et al. disclose (abstract, page L1502) an organic compound using iridium-complex demonstrating light emission from a triplet excited state. It is further disclosed this triplet emitter has quite high quantum efficiency of phosphorescence resulting in high-performance flat-panel displays.

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Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to substitute luminescent compound having emission from triplet state as disclosed by Tsutsui et al. for oxadiazole derivatives as the light emitting compound of Aziz and Fujita for extremely high quantum efficiency of phosphorescence and producing high-performance flat-panel displays.

Regarding claims 19, 22 and 24 Tsutsui et al. disclose tris (2-phenylpyridine) iridium (Ir(ppy)_3) as the light emitting compound having iridium as central metal.

Claims 39,40,43-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,392,339 to Aziz et al. and U.S. Patent 5,925,980 to So et al. and further in view of U.S. Patent 6,566,807 to Fujita et al.

Claim 39 essentially recites the same limitation as of claims 5 and 16 and hence is rejected for the same reasons (see rejection of claims 5 and 16).

Claim 40 essentially recite the same limitation as of claims 5 and 17 and hence are rejected for the same reasons (see rejection of claims 5 and 17).

Claims 43,44 essentially recite the same limitation as of claims 5 and 20,21 and hence are rejected for the same reasons (see rejection of claims 5 and 20,21).

Claims 45,46 essentially recite the same limitation as of claims 5 and 22,23 and hence are rejected for the same reasons (see rejection of claims 5 and 22,23).

Claims 41,42,46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,392,339 to Aziz et al., U.S. Patent 5,925,980 to So et al. and U.S. Patent 6,566,807 to Fujita et al. and further in view of " High Quantum

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Efficiency in Organic Light-Emitting Devices with Iridium-Complex as a Triplet Emissive Center" by Tsutsui et al. (Literature 8).

Claim 41 essentially recites the same limitation as of claims 5 and 18 and hence is rejected for the same reasons (see rejection of claims 5 and 18).

Claims 42,45 and 47 essentially recite the same limitation as of claims 5 and 19,22 and 24 respectively and hence are rejected for the same reasons (see rejection of claims 5 and 19,22 and 24).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 5,955,836 to Boerner et al. discloses mixed layer formed by a mixture of hole transporting and electron transporting materials.

U.S. Patent 5,486,406 to Shi, U.S. Patent 5,925,472 to Hu et al. and U.S. Patent 6,121,727 to Kanai et al. disclose organic electroluminescent devices with different organic compounds for light emission.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (703) 308-2826. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (703) 305-4794. The fax phone number for the organization is (703) 308-7382.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

S.R.

Sikha Roy
Patent Examiner
Art Unit 2879

Ashok Patel
ASHOK PATEL
PRIMARY EXAMINER